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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 09/919,643
Filing Date: July 31, 2001
Appellant(s): ILSLEY ET AL.

Lynn Kidder and Bret Field
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 4/11/08 appealing from the Office action mailed 8/22/07.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

Art Rejection References:

Caren et al (US 6,221,653; 04/24/2001; filing date 4/27/1999);

Caren et al (US 6,797,469 B2; 09/28/2004; filed 03/26/2001);

Deeg et al (US 5,338,688; 08/16/1994)

5,409,134;

Definitions for the term "reagent" from Merriam-Webster Online Dictionary; Downloaded from merriam-webster.com on 5/8/08.

ODP References:

6,797,469;

6,221,653;

6,656,740;

6,323,043;

6,884,580;

6,242,266;

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Art Rejections

Caren ('653)

Claims 1, 2, 4, 6-10, 12, 13, 15-18, 20, 21, and 35-38 are rejected under **35 U.S.C. 102(a, e)** as anticipated by **Caren** et al (US 6,221,653; 04/24/2001; filing date 4/27/1999).

Caren et al, throughout the patent, teach a method for depositing a quantity of fluid containing a plurality of binding agents onto a substrate surface (such as an array) (e.g. Claims 1 and 6 of the reference), which reads on the method of depositing fluid on a substrate of **clms 1, 12** and **17** as well as the planar substrate and reagent chamber of **clms 9, 10, 15, 16, 20** and **21.** The reference further claims the deposition is through a thermal inkjet (e.g. Claim 1) through a "positioning" and an "actuating" steps, which reads on the steps of **clms 1, 12** and **17**. The reference also teaches loading fluid into the thermal inkjet head by allowing fluid flow through the orifice into said firing chamber (e.g. Claims 1 and 6), and applying back (negative) pressure to said head during the contacting step (e.g. Claim 7; col. 5, lines 52+), which read on the front loading step of **clms 1, 12** and **17** and back (negative) pressure of **clms 2, and 35.** The reference further teaches the deposit fluid comprises "biomolecules" including "polypeptides" (i.e. proteins), enzymes (e.g. col.4, lines 35+) as well as cell lysates (containing essentially protein mixtures) (e.g. Claim 3; col. 4, lines 20+), which reads on the protein reagent of **clms 1, 7, 8, 12, 17** and **36-38.** The polypeptide of the reference has the inherent property of being "a member of a specific binding pair" as recited in **clms 7** and **37** because any polypeptide (or protein) can be a member of a specific binding pair such as in a protein-antibody binding complex.

The reference also teaches volumes of the firing chamber, for example, about 1 pl to 1.5 nl (col. 5, lines 6+), which reads on the no more than (or less than) about 5 μl, and 2 μl of **clms 1, 4, 12, 13, 17** and **18.**

The reference teaches washing fluid deposited by the thermal inkjet head (col. 7, lines 45+), which reads on the inkjet head washing step of **clms 6**, **12** and **17.**

Caren ('469)

Claims 1, 2, 4, 6-10, 12, 13, 15-18, 20, 21, and 35-38 are rejected under **35 U.S.C. 102(e)** as anticipated by Caren et al (US 6,797,469 B2; 09/28/2004; filed 03/26/2001; earlier priority date 4/27/1999)

Caren et al, throughout the patent teach:

"A method for depositing a quantity of fluid containing a nucleic acid or polypeptide onto an array surface having a plurality of nucleic acids or polypeptides stably associated therewith, said method comprising: loading said fluid containing nucleic acid or polypeptide into a thermal inkjet head comprising an orifice and a firing chamber by contacting said orifice with said fluid in a manner sufficient for said fluid to flow through said orifice into said firing chamber; positioning said thermal inkjet head filled with said nucleic acid or polypeptide containing fluid in opposing relation to said substrate; and actuating said thermal inkjet head in a manner sufficient to expel a quantity of said fluid onto said substrate surface to deposit said quantity of fluid on said substrate surface." (e.g. Claim 19 of the reference; col.4, lines 25+). This teaching reads on the method of **clms 1, 12** and **17**, and the planar substrate and reagent chamber of **clms 9, 10, 15, 16, 20** and **21.**

The reference also teaches applying back (negative) pressure to said head during the contacting step (e.g. Claim 20; col. 5, lines 60+), which read on the front loading step of **clms 1, 12** and **17**, and back (negative) pressure of **clms 2**, and **35.** The reference further teaches the deposit fluid comprises polypeptides (i.e. protein or a member of a specific binding pair) and enzymes (e.g. Claim 19; Col.4, lines 25+), which reads on the protein reagent of **clms 1, 7, 8, 12, 17,** and **36-38.** The polypeptide of the reference has the inherent property of being "a member of a specific binding pair" as recited in **clms 7** and **37** because any polypeptide (or protein) can be a member of a specific binding pair such as in a protein-antibody binding complex.

The reference also teaches volumes of fluid, for example, about 0.1 pl to 2000 pl (Claim 23), which reads on the no more than (or less than) about 5 μl, and 2 μl of **clms 1, 4, 12, 13, 17** and **18.**

The reference teaches washing fluid deposited by the thermal inkjet head (col. 7, lines 55+), which reads on the inkjet head washing step of **clms 6**, **12** and **17.**

Deeg

Claims 1, 2, 4-10, 12-28, and 35-39 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Deeg et al (US 5,338,688; 08/16/1994).

Deeg et al, throughout the patent, teach a method generating of a biochemical analytical liquid to a target (See Abstract of the reference). The reference teaches ejecting biochemical analytical liquid from a jet chamber (See Claim 1 of the reference), and an inkjet printing head with an ink reservoir (reads on firing chamber of **clms 1, 12, 17, 22**) was used (See Column 6,

lines 58-68 of the reference). Since thermal inkjet would utilize pressure to eject fluid onto substrate and aspiration of reagent solution (e.g. See Example 4, step e)), these read on "applying back pressure to said head" of **clm 2**. These also read on a thermal inkjet head comprising an orifice (See Figure 1 of the reference, for example) and a firing chamber, and positioning said loaded thermal inkjet head in opposing relation to said surface (See Figure 1 of the reference) of **clms 1, 12, 17, 22**. The reference further teaches the target could be paper or polystyrene tubes (read on planar substrate and surface of reagent chamber; See Column 7, lines 55-60; Column 8, lines 14-17), as recited in **clm 9, 10, 15, 16, 20, 21, 26, 27**. The reference teaches the biochemical analytical liquid could be an enzyme, an antibody, etc. (reads on protein reagent and enzyme that are members of a specific binding pair as recited in **clms 7, 8, 24, 25, and 36-39**; See Claim 8 of the reference). In addition, the reference teaches the quantity of liquid ejected through the jet is no more than 2000 picoliters (reads on no more than about 2 or 5 microliter as recited in **clms 1, 4, 12, 13, 17, 18**; See Claim 14 of the reference). The reference also teaches the metered volumes were between 0.23 and 80 nl (reads on "not exceed about 200 picolitres" of **clm 28**; See Column 7, line 24). The reference further teaches a concentration of 0.5 mg/ml (reads on protein of interest is present in said fluid at a concentration that ranges from about 5 to 1000 ug/ml" as recited in **clms 5, 14, 19, 22**) of the enzyme peroxidase was used to deposit in tubes by ink-jet (See Column 7, lines 14-17).

The instant specification does not specifically define the step of "washing said head," which can broadly and reasonably interpreted to be any subsequent washing (or cleaning) step. The reference teaches washing steps consisting of metering tap water (reads on washing the head following actuating step as recited in **clms 6, 12, 17, 23**; See Example 4, a)-h) of the reference)

because the washing solution (e.g. tap water) would flow through the ink jet head (thus washing the head). In addition, it would have been prima facie obvious for one of ordinary skill in the art to wash the inkjet head after the sample depositing step, because washing steps are needed to clean the inkjet heads after sample delivery so that different samples can be delivered or the inkjet head can be cleaned for future uses.

Although the '688 patent does not explicitly teach the step of "front loading said quantity of fluid into a thermal inkjet head …", the claimed thermal inkjet head inherently performs "front loading" process. See MPEP 2112.02:

> "Under the principles of inherency, if a prior art device, in its normal and usual operation, would necessarily perform the method claimed, then the method claimed will be considered to be anticipated by the prior art device. When the prior art device is the same as a device described in the specification for carrying out the claimed method, it can be assumed the device will inherently perform the claimed process. In re King, 801 F.2d 1324, 231 USPQ 136 (Fed. Cir. 1986)."

The device used in the claimed method (or process) is the same as (i.e. a thermal inkjet head printing device) the device of the '688 patent without evidence to the contrary. The instant specification discloses the general characteristics of the "thermal inkjet heads" that are used for the claimed method (see p.6, [0016] of the instant spec.):

> "Thermal inkjet heads finding use in the subject methods will generally have the following characteristics. The size of the orifice is sufficient to produce a spot of suitable dimensions on the substrate surface (described in greater detail infra), where the orifice generally has a diameter (or exit diagonal depending on the specific format of the ink jet head) ranging from about 1 to 1000μm, usually from about 5 to 100 μm and more usually from about 10 to 60 μm. The firing chamber has a volume ranging from about 1 pl to 10 nl, usually from about 10 pl to 5 nl and more usually from about 35 pl to 1.5 nl. The heating element …"

These "characteristics" are possessed by the "thermal inkjet" described in '688 (e.g. an orifice having drop diameter of 75 μm, and a firing chamber with at least 230 pl capacity, as well as a "heating element" for creating the air bubble; see col. 6, lines 60+ and col. 3, lines 30+ of the '688 patent). In addition, the instant specification also discloses that the device (the thermal inkjet) described in the '688 patent is known for "depositing bio/chemical agents such as proteins and nucleic acids" (p. 2, [0005] of the spec.). Furthermore, applicants have stated on record that "the Deeg apparatus may be capable of being front loaded…" (emphasis in original) in the Reply entered 9/21/06, at p. 8, last para.

The instant specification also discloses "the thermal inkjet device is front loaded with a fluid sample" with the term "the thermal inkjet device" referring to the devices described on p.6, [0016]. Thus, it can be logically concluded that the "thermal inkjet head" of the prior art as described in the instant specification or the inkjet head of the '688 patent, "in its normal and usual operation, would necessarily perform the method claimed".

Furthermore, the term "front loading" is not specifically defined, and is broadly used in the instant specification. For example, the instant specification states the followings:

> "In this front loading protocol, the orifice is contacted with fluid under conditions sufficient for fluid to flow through the orifice and into the firing chamber of the head, where fluid flow is due, at least in part, to capillary forces. To assist in the flow of fluid in to the orifice, back pressure in the form of suction (i.e. negative pressure) may be applied to the firing chamber of the head to assist in the flow of fluid to into the orifice" (see [0017] of the specification; emphasis added).

Thus, the only required structural elements from this example of "front loading" described in the instant specification are: contacting the orifice with fluid, flowing the fluid

through the orifice to the firing chamber, and the "flowing" is due to "capillary forces" and maybe additional back pressure.

Therefore, from the above description of the "front loading" procedure, it is reasonable to conclude that the "front loading" is mainly through capillary forces. It is known in the art that capillary force is an inherent property of narrow tube to draw a liquid upwards against the force of gravity (see the previously cited definition for "Capillary Action" from Wikipedia.org; 2006; attached to the previous Office action, mailed 7/28/06). Thus the "front loading" capillary action is an inherent property of the inkjet head due to the narrow tube of the nozzle or firing chamber. In other words, whenever the inkjet head orifice, in its normal and usual operation, is in contact with a fluid, the inherent function of capillary suction (or "front loading") is necessarily performed by the inkjet head.

Furthermore, the instantly claimed "thermal inkjet head" used in printing ink or biological material, "in its normal and usual operation", would "necessarily perform" back or negative pressure to retain fluid in the nozzle and firing chamber. For example, Cowger et al (US 5,409,134; 4/25/1995) teaches that "back pressure at the print head must be at all times strong enough for preventing ink leakage" and "a slight back pressure at the print head to prevent ink leakage" in thermal inkjet heads (co. 1 of '134). Thus, thermal inkjet heads are known to operate under "back" or "negative" pressure in addition to the capillary force, so that the fluid or ink in contact with the orifice is suctioned in the head before ejection.

Thus, the reference's teaching anticipates or renders obvious the instant claimed invention.

Double Patenting

'469

Claims 1, 2, 9 and 11 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 19-21 and 23 of U.S. Patent No. 6,797,469 B2 (hereinafter referred to as '469 patent).

The '469 patent claims a method for depositing a quantity of fluid containing a nucleic acid or polypeptide (would read on protein and enzyme) onto an array surface (See Claim 19 of the reference). The reference further claims the deposition is through a thermal inkjet (See Claim 19), and applying back pressure during the contacting step (Claim 20). The reference further teaches the deposited quantity ranges from about 0.1 to 2000 pico liters (See Claim 23).

'653

Claims 1, 2 and 9 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 3, 5-7, 9, 10, 12, 17, and 19 of U.S. Patent No. 6,221,653 B1 (hereinafter referred to as '653 patent).

The '653 patent recites a method for depositing a quantity of fluid containing a plurality of binding agents onto a substrate surface (See Claim 1 of the reference). The reference further claims the deposition is through a thermal inkjet (See Claim 1), and applying back pressure to said head during the contacting step (See Claim 7). The reference further teaches the deposit fluid comprises bimolecular (would read on proteins; See Claim 3 and Col.4, 21+).

'740

Claims 1, 2, 9 and 11 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 5, 9, 11-13, 15 and 18 of U.S. Patent No. 6,656,740 B1 (hereinafter referred to as '740 patent).

The '740 patent recites a method for fabricating an array of biopolymers on a substrate using a biopolymer fluid (would read on protein and enzyme; See Claim 1 and Column 4, lines 20-25). The reference further claims the deposition is through a thermal inkjet (See Claims 9 and 11). The reference teaches varying primer pressure reaches a value that is less than ambient pressure outside the orifice (Claim 13), which would read on applying back pressure. The reference further teaches the fluid capacity of the chamber is in the range between 1 pL to 10 nL (See Claim 18), which would read on the deposited quantity not exceeding about 200 pL.

'043 and '580

Claims 1, 2, 6 and 7 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-5, 7 and 11-19 of U.S. Patent No. 6,323,043 B1 (hereinafter referred to as '043 patent) and claims 1, 2, 4 and 6 of its related U.S. Patent No. 6,884,580. Upon further consideration, the previous rejection over the instant claim 8 is withdrawn.

For simplicity sake, only the relevant claims from the '043 patent (the parent) are discussed below. Although the conflicting claims are not identical, they are not patentably distinct from each other. The '043 patent recites a method for fabricating an array of biopolymers on a substrate using a biopolymer fluid (would read on protein and enzyme; See

Claim 1 and Column 5, lines 63+). The reference further claims the deposition is through a thermal inkjet (See Claim 1 and Column 10, lines 23-35). The reference teaches the load pressure is a negative pressure (Claim 2). The reference also teaches the jet head is exposed to cleaning fluid (e.g. Claim 7), which would read on washing the head.

'266

Claims 1-4 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 3, 8, 12, 14, 15 and 18 of U.S. Patent No. 6,242,266 B1 (hereinafter referred to as '266 patent).

The '266 patent recites a method for fabricating an array of biopolymers on a substrate using a biopolymer fluid (would read on protein and enzyme; See Claim 1 and Column 6, lines 14-15). The reference further claims the deposition is through a thermal inkjet (See Claim 1 and Column 3, lines 45-50). The reference teaches the spotting pressure is a negative pressure (Claim 3). The reference also teaches each fluid droplet deposited on the substrate has a volume of from 0.1 to 1000 pL (Claim 8).

(10) Response to Argument

Art Rejections

Caren et al ('653)

Appellants traversed the above rejection over Caren et al ('653) by arguing the following:

The "653 patent "fails to teach, either expressly or inherently, the method of depositing a quantity of fluid containing a protein reagent, or protein reagent binding pair of interest onto a surface of a substrate, as is claimed" (Appeal Brief, pp.8+).

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., protein reagent binding pair of interest) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See In re Van Geuns, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). For example, the instant claims do not recite "protein reagent binding pair of interest", rather the instant claim 12 recites "a protein reagent binding pair member" (emphasis added). That is only one member of the "protein reagent binding pair" is contained within the fluid.

Appellants mainly assert the '653 patent does note teach "a protein reagent" as recited in all of the pending independent claims. Appellants assert "the instant specification is clear as to the meaning and use of the term "protein reagent." (Brief, p.12). Appellants quote the followings from the instant specification:

> "Accordingly, there is continued interest in the development of new protocols for use in the deposition of fluids containing proteins onto a substrate surface. Of particular interest would be the development of a protocol that ... allows the flexibility to change the protein solution deposited and deliver multiple reagents simultaneously."(p. 2, lines 8-14)

And further:

> "The subject methods of depositing a volume of fluid sample onto the surface of a substrate find use in a variety of different applications, and are particularly suited for use in methods where reproducible placement of small volumes of a reagent onto the surface of a solid support are desired. As such, the subject methods find use in the preparation and manufacture of biosensors, microarrays, e.g., proteomic arrays, microfluidic devices, and the like. (p. 12, lines 26-p. 13, line 1)

And in Example IV:

> "... The slide is then scanned for covalently linked Cy5-dCMP to the DNA attached to the surface, indicating that the DNA polymerase synthesized DNA. The results show that multiple reagents may be deposited onto the surface using the subject methods. (p. 17, lines 6-9)

If appellants are asserting that the terms "fluids containing proteins" and "protein solution" are equivalent to "protein reagents", then the cited reference teaches fluids containing proteins or protein solutions as discussed in the body of the rejection. Specifically, the '653 patent teaches the deposit fluid comprises "biomolecules" including "polypeptides" (i.e. proteins), enzymes (e.g. col.4, lines 35+) as well as cell lysates (containing essentially protein mixtures) (e.g. Claim 3; col. 4, lines 20+), which reads on the protein reagent of **clms 1, 7, 8, 12, 17** and **36-38.** The polypeptide of the reference has the inherent property of being "a member of a specific binding pair" as recited in **clm 12** because any polypeptide (or protein) can be a member of a specific binding pair such as in a protein-antibody binding complex.

It is not clear how the above quoted 2nd and 3rd paragraphs provide support for a specific definition of "a protein reagent". The 2nd paragraph provides a general recitation of making various arrays, and the 3rd paragraph is reciting a DNA microarray (not protein arrays or protein reagents).

Appellants also seem to argue the term "reagent" is not taught by the cited '653 patent. (Brief, pp.9+). Appellants seem to insist on treating the term "reagent" separately from the term "protein". However, the instant claims (e.g. claim 1) recites "a quantity of a fluid containing a protein reagent of interest", which, given the broadest and reasonable interpretation, means a fluid containing a protein. As long as a fluid that is being deposited contains proteins, the fluid reads on the claimed "fluid containing a protein reagent".

The instant specification does not provide a specific definition for the term "a protein reagent" or "reagent". The term "reagent" in general is referring to "a substance used (as in detecting or measuring a component, in preparing a product, or in developing photographs)

because of its chemical or biological activity" (Def of "reagent" downloaded from Merriam-Webster Online Dictionary, on 5/8/08).

Appellant also provides a dictionary definition of for the term "reagent" as "a substance used in a chemical reaction to detect, measure, examine, or produce other substances". (Brief, p.9, para 4), which definition is broad and encompassing any "substance" including the so-called analytes. As discussed above, the '653 patent teaches depositing "a quantity of fluid" on a substrate surface (see claim 1 of '653), which the quantity of fluid comprises a "biomolecule" (see claim 3 of '653). The '653 patent also teaches a "biomolecule" includes "polypeptides" (i.e. proteins) (e.g. col.4, lines 21+). In addition, the reference also teaches the fluid sample can also include "enzymes". As these proteins are used to bind to "measure" or "examine" the binding agent on the array substrate (such as through interaction between specific binding pairs) (e.g. cols.3-4), they fall within the scope of the definitions cited above. For example, according to the Merriam-Webster definition, the proteins of the reference are used detect or measure other molecules such as other proteins (i.e. components). In other words, through the interaction or binding of the proteins contained within the "quantity of fluid" and the binding agent on the array, a detection signal (or measuring signal) is produced. Thus, even according to the narrower definition provided by appellants, the proteins contained in the deposited "quantity of fluid" read on a "reagent" or "a protein reagent" (as the binding interaction between proteins read on a chemical reaction).

Appellants also seem to assert because the '653 patent teaches "deposition of sample", the reference does not teach deposition of a "reagent" because the proteins contained within the fluid of '653 patents is not "used in a chemical reaction to detect, measure, examine…" (Brief,

p.9, para 4). Appellants are arguing the intended use or inherent property of the "protein" contained within the "quantity of fluid". The instant claims only recite "depositing a quantity of a fluid containing a protein reagent" without reciting additional steps of using the proteins. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. Appellants have not provided any evidence to indicate that the proteins contained with the quantity of fluid of the '653 patent is structurally different from the "proteins" of the instant claims. As discussed supra, the proteins (polypeptides or enzymes) of the '653 patent are capable of performing the intended uses of "detecting" or "measuring" other substances (such as through specific binding interactions). Thus, the reference teaches all element of the claimed invention.

Appellant further assert the instant specification provides a specific definition for term "quantity of fluid" (Brief, pp.12+). However, appellants have not demonstrated any structural difference between the "quantity of fluid" of the '653 patent and the "quantity of fluid" of the instant claimed invention. As discussed above, the '653 patent teaches depositing a "quantity of fluid" (claim 1) as well as specific fluid quantities (e.g. col. 5, lines 6+).

Caren et al ('469)

Appellants traversed the above rejection over Caren et al ('469) by arguing the following:

Similar to the traversal of the rejection under '653 patent, appellants assert the '469 patent "fails to teach, either expressly or inherently, the method of depositing a quantity of fluid containing a protein reagent, as is claimed" (Appeal Brief, pp.15+).

Appellants seem to assert because the '469 patent teaches "deposition of sample", the reference does not teach deposition of a "reagent" because the proteins contained within the fluid of '469 patents is not "used in a chemical reaction to detect, measure, examine…" (Brief, pp.15+). Appellants are arguing the intended use or inherent property of the "protein" contained within the "quantity of fluid". The instant claims only recite "depositing a quantity of a fluid containing a protein reagent" without reciting additional steps of using the proteins. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. Appellants have not provided any evidence to indicate that the proteins contained with the quantity of fluid of the '469 patent is structurally different from the "proteins" of the instant claims.

As discussed supra, the '469 patent teaches the deposited "quantity of fluid" comprises polypeptides (i.e. protein or a member of a specific binding pair) and enzymes (e.g. Claim 19; Col.4, lines 25+), which reads on the protein reagent of **clms 1, 7, 8, 12, 17,** and **36-38.** The polypeptide of the reference has the inherent property of being "a member of a specific binding pair" as recited in **clms 7** and **37** because any polypeptide (or protein) can be a member of a specific binding pair such as in a protein-antibody binding complex. The reference also teaches these proteins contained within the quantity of fluid are used to bind to "measure" or "examine"

the binding agent on the array substrate (such as through interaction between specific binding pairs) (e.g. cols.3-4). Thus, the proteins (polypeptides or enzymes) of the '469 patent are capable of performing the intended uses of "detecting" or "measuring" other substances (such as through specific binding interactions). In addition, the deposited proteins of the '496 patent would also retain the proteins' "functionalities," because the proteins can be detected through binding interactions. Thus, the reference teaches all element of the claimed invention.

Deeg et al

Appellants traversed the above rejection over Deeg et al by arguing the following:

1.) The Deeg reference "fails to teach, expressly, or inherently, front loading a fluid into an inkjet head by contacting an orifice with the fluid in a manner so that the fluid flows through the orifice and into a firing chamber, as is claimed". (Brief, p.20).

Appellants further assert "the inkjet head orifice of Deeg, in its normal and usual operation, does not necessarily perform the 'inherent function of capillary suction' when in contact with a fluid." (Brief, p.20, last para).

Although the '688 patent does not explicitly teach the step of "front loading said quantity of fluid into a thermal inkjet head …", the claimed thermal inkjet head inherently performs this "front loading" process. See MPEP 2112.02:

> "Under the principles of inherency, if a prior art device, in its normal and usual operation, would necessarily perform the method claimed, then the method claimed will be considered to be anticipated by the prior art device. When the prior art device is the same as a device described in the specification for carrying out the claimed method, it can be assumed the device will inherently perform the claimed process. In re King, 801 F.2d 1324, 231 USPQ 136 (Fed. Cir. 1986)."

See also *In re Best* 195 USPQ 430, 433 (CCPA 1977), where the court stated:

> Where, as here, the claimed and prior art products are identical or substantially identical, or are produced by identical or substantially identical processes, the PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his claimed product. See In re Ludtke, supra. Whether the rejection is based on "inherency" under 35 USC 102, on "prima facie obviousness" under 35 USC 103, jointly or alternatively, 4 the burden of proof is the same, and its fairness is evidenced by the PTO's inability to manufacture products or to obtain and compare prior art products. See In re Brown, 59 CCPA 1036, 459 F.2d 531, 173 USPQ 685 (1972).

The device used in the claimed method (or process) is the same as (i.e. a thermal inkjet head printing device) the device of the '688 patent without evidence to the contrary. The instant specification discloses the general characteristics of the "thermal inkjet heads" that are used for the claimed method (see p.6, [0016] of the instant spec.):

> "Thermal inkjet heads finding use in the subject methods will generally have the following characteristics. The size of the orifice is sufficient to produce a spot of suitable dimensions on the substrate surface (described in greater detail infra), where the orifice generally has a diameter (or exit diagonal depending on the specific format of the ink jet head) ranging from about 1 to 1000μm, usually from about 5 to 100 μm and more usually from about 10 to 60 μm. The firing chamber has a volume ranging from about 1 pl to 10 nl, usually from about 10 pl to 5 nl and more usually from about 35 pl to 1.5 nl. The heating element …"

These "characteristics" are possessed by the "thermal inkjet" described in '688 (e.g. an orifice having drop diameter of 75 μm, and a firing chamber with at least 230 pl capacity, as well as a "heating element" for creating the air bubble; see col. 6, lines 60+ and col. 3, lines 30+ of the '688 patent). In addition, the instant specification also discloses that the device (the thermal inkjet) described in the '688 patent is known for "depositing bio/chemical agents such as proteins and nucleic acids" (p. 2, [0005] of the spec.). Furthermore, applicants have stated on record that

"the Deeg apparatus may be capable of being front loaded…" (emphasis in original) in the Reply entered 9/21/06, at p. 8, last para.

The instant specification also discloses "the thermal inkjet device is front loaded with a fluid sample" with the term "the thermal inkjet device" referring to the devices described on p.6, [0016]. Thus, it can be logically concluded that the "thermal inkjet head" of the prior art as described in the instant specification or the inkjet head of the '688 patent, "in its normal and usual operation, would necessarily perform the method claimed".

In addition, MPEP § 2112 V states that "once a reference teaching product appearing to be substantially identical is made the basis of a rejection, and the examiner presents evidence or reasoning tending to show inherency, the burden shifts to the applicant to show an unobvious difference" (see heading).

Furthermore, the term "front loading" is not specifically defined, and is broadly used in the instant specification. For example, the instant specification states the followings:

> "In this front loading protocol, the orifice is contacted with fluid under conditions sufficient for fluid to flow through the orifice and into the firing chamber of the head, where fluid flow is due, at least in part, to capillary forces. To assist in the flow of fluid in to the orifice, back pressure in the form of suction (i.e. negative pressure) may be applied to the firing chamber of the head to assist in the flow of fluid to into the orifice" (see [0017] of the specification; emphasis added).

Thus, the only required structural elements from this example of "front loading" described in the instant specification are: contacting the orifice with fluid, flowing the fluid through the orifice to the firing chamber, and the "flowing" is due to "capillary forces" and maybe additional back pressure.

Therefore, from the above description of the "front loading" procedure, it is reasonable to conclude that the "front loading" is mainly through capillary forces. It is known in the art that capillary force is an inherent property of a narrow tube to draw a liquid upwards against the force of gravity (see the previously cited definition for "Capillary Action" from Wikipedia.org; 2006; attached to the previous Office action, mailed 7/28/06). Thus the "front loading" capillary action is an inherent property of the inkjet head due to the narrow tube of the nozzle or firing chamber. In other words, whenever the inkjet head orifice, in its normal and usual operation, is in contact with a fluid, the inherent function of capillary suction (or "front loading") is necessarily performed by the inkjet head.

Furthermore, the instantly claimed "thermal inkjet head" used in printing ink or biological material, "in its normal and usual operation", would "necessarily perform" back or negative pressure to retain fluid in the nozzle and firing chamber. For example, Cowger et al (US 5,409,134; 4/25/1995) teaches that "back pressure at the print head must be at all times strong enough for preventing ink leakage" and "a slight back pressure at the print head to prevent ink leakage" in thermal inkjet heads (co. 1 of '134). Thus, thermal inkjet heads are known to operate under "back" or "negative" pressure in addition to the capillary force, so that the fluid or ink in contact with the orifice is suctioned in the head before ejection.

Thus, the reference's teaching anticipates or renders obvious the instant claimed invention.

Appellant also seem to argue that because the preferred embodiment of the Deeg reference is to load fluid through a reservoir, the reference does not explicitly teach "front loading". (Brief, pp.21+). However, the court has provided the following:

"The use of patents as references is not limited to what the patentees describe as their own inventions or to the problems with which they are concerned. They are part of the literature of the art, relevant for all they contain." In re Heck, 699 F.2d 1331, 1332-33, 216 USPQ 1038, 1039 (Fed. Cir. 1983) (quoting In re Lemelson, 397 F.2d 1006, 1009, 158 USPQ 275, 277 (CCPA 1968))."

In this case, whenever fluids or liquids are in contact with the inkjet head, the fluids are being "front loaded" due to the inherent capillary action of the inkjet head. For example, if fluids are present in the inkjet heads, the fluids are being "front loaded" (due to capillary actions) as the term is broadly defined in the instant specification.

Appellants also assert "the Examiner has not provided 'technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teaching of the applied prior art'" (Brief, p.23). Appellants are respectfully directed to the body of the rejection as well as the discussion above for the scientific reasoning for the inherency discussion.

2.) Appellant also traversed over the "obvious rejection" over the Deeg reference. (Brief, pp.23+).

As discussed supra, the Deeg reference teaches all elements of the claimed invention either explicitly or inherently. Because the inkjet head of the Deeg reference inherently possess the function of "front loading" (i.e. loading liquid or fluid through capillary action), it would have been prima facie obvious for one of ordinary skill in the art to completely "front load" fluid using the inkjet head of the Deeg reference. As evidenced by Cowger et al (US 5,409,134; 4/25/1995), "back pressure at the print head must be at all times strong enough for preventing ink leakage" and "a slight back pressure at the print head to prevent ink leakage" in thermal inkjet heads (co. 1 of '134). Thus, all inkjet printer heads have capillary forces and/or back pressure to prevent fluid inside of the head from leaking out of the inkjet heads. Using the known technique of "front loading" fluids from the orifice of the head to by capillary action or back pressure would have been obvious to one of ordinary skill. Further, it would have been obvious to a person of ordinary skill in the art to try completely front load of all loading fluids through the orifice to improve the inkjet loading process, as a person with ordinary skill has good reason to pursue the known option within his or her technical grasp.

To completely "front load" all fluids through the orifice would not change the principle of operation of the prior art invention, because the inkjet is still being used for loading and depositing fluids comprising various entities (or biomolecules) on substrates.

3.) Appellants also assert the Deeg reference does not teach "applying back pressure". (Brief, pp.28+ and pp.32+).

As discussed supra, the reference teaches thermal inkjet utilizes pressure to eject fluid onto substrate and aspiration of reagent solution (e.g. See Example 4, step e)), these read on "applying back pressure to said head" of **clm 2**. In addition, "back pressure" is an inherent property of inkjet head for preventing fluid leakages, as evidenced by Cowger et al (US 5,409,134; 4/25/1995). Cowger et al, teach "back pressure at the print head must be at all times strong enough for preventing ink leakage" and "a slight back pressure at the print head to prevent ink leakage" in thermal inkjet heads (co. 1 of '134). Thus, the reference's teaching anticipates or renders obvious the instant claimed method step.

4.) Appellants also assert the Deeg reference fails to teach "washing said head following said actuating step". (Brief, pp.30+).

The instant specification does not specifically define the step of "washing said head," which can broadly and reasonably interpreted to be any subsequent washing (or cleaning) step. The reference teaches washing steps consisting of metering tap water (reads on washing the head following actuating step as recited in **clms 6, 12, 17, 23**; See Example 4, a)-h) of the reference) because the washing solution (e.g. tap water) would flow through the ink jet head (thus washing the head). In addition, it would have been prima facie obvious for one of ordinary skill in the art to wash the inkjet head after the sample depositing step, because washing steps are needed to clean the inkjet heads after sample delivery so that different samples can be delivered or the inkjet head can be cleaned for future uses.

Appellant argue using the "metering unit" of the reference (unit 28) for the washing step does not involve using the jet head. (Brief, p.31). The Deeg reference, for examples, teaches

"washing steps" are carried out "with the metering unit of the system". The Deeg reference also teaches several "metering units" on the apparatus including "reagent metering station" (31), reagent metering station (23), sample metering unit (28), etc. (e.g. col.4; Figure 2), which the reference explicitly teaches jet heads in elements 23 and 32. The reference also teaches the ink jet head (element 31) is downstream to the washing unit (element 29a ; see Figure 2), which the washing liquid dispensed can "wash" the ink jet head on station 31 when the inkjet head is contacted with substrate. In addition, the Deeg reference teaches metering small quantity of liquids using an ink jet head in general (e.g. Abstract). The Deeg reference also teaches using "metering" units for the washing step. Thus, it would also have been prima facie obvious for one of ordinary skill in the art to using inkjet head to "meter" small quantities of washing solution (such as water, thus washing the inkjet itself as well) that are appropriate for the measured samples. Using the known technique to wash the inkjet head after sample/reagent dispensing for the predictable result of improving sample deposition using inkjet heads would have been obvious to one of ordinary skill.

Double Patenting

'469

Appellants traversed the above rejection over the '469 patent by arguing the followings:

The '469 patent fails to teach the method of depositing a quantity of fluid containing a protein reagent.

The '469 patent claims "depositing a quantity of fluid containing a nucleic acid or polypeptide" (claim 19), which the "quantity of fluid containing a polypeptide" reads on the "quantity of a fluid containing a protein reagent" of the instant claims. Appellants presented the

same argument as the argument over the art rejection under the '469 patent. Appellants are respectfully directed to the above discussion under '469 (Art rejection) for answer to arguments. In general, Appellants have not provided any evidence to indicate that the proteins contained with the quantity of fluid of the '469 patent is structurally different from the "proteins" of the instant claims.

As discussed supra, the '469 patent claims the deposited "quantity of fluid" comprises polypeptides (i.e. protein or a member of a specific binding pair) and enzymes (e.g. Claim 19). The reference patent also teaches these proteins contained within the quantity of fluid are (inherently) capable of being used to "measure" or "examine" the binding agent on the array substrate (such as through interaction between specific binding pairs) (e.g. cols.3-4). Thus, the proteins (polypeptides or enzymes) of the '469 patent are capable of performing the intended uses of "detecting" or "measuring" other substances (such as through specific binding interactions) as a "reagent".

'653

Appellants traversed the above rejection over the '653 patent by arguing the followings:

The '653 patent fails to teach the method of depositing a quantity of fluid containing a protein reagent.

Appellants presented the same arguments as the argument over the art rejection under the '653 patent.

As discussed above, the '653 patent a method for depositing a quantity of fluid containing a plurality of binding agents onto a substrate surface (See Claim 1 of the reference) and deposited fluid comprises "a biomolecule" (Claim 3). The reference also teaches the term "biomolecules" encompasses polypeptide (i.e. proteins) (See Claim 3 and Col.4, 21+), which the deposited proteins read on the protein reagents.

Appellants are respectfully directed to the above discussion under '653 (Art Rejection) for answer to argument regarding the term "reagent".

'740

Appellants traversed the above rejection over the '740 patent by arguing the followings:

"The Appellant again assert that the claims of Caren '740 are directed to a method of fabricating an array of biopolymers by in-situ synthesis." Appellants assert because "multiple iterative steps are performed in order to form the final features on the array" of the '740 patent, the '740 patent is distinguishable over the instant claimed invention. (Brief, p.42).

Contrary to appellant assertion, the '740 patent claims the followings:

"A method of fabricating an array of biopolymers on a substrate using a biopolymer or biomonomer fluid", which the biopolymer fluid read on a fluid containing a protein reagent because the '740 patent defines the term "biopolymer" to include proteins (See Claim 1 and Column 4, lines 20-25). The '740 patent does not specifically claim "in-situ synthesis" as asserted by appellant. Even if "in-situ synthesis" is intended by the '740 patent, the instant claim language is broad and would encompass the so-called "in-situ synthesis" process.

In addition, the instant specification does not specifically define the term "functionality", which can be broadly and reasonably interpreted to mean any "functions" or activity of the protein. The reference teaches that the formed array with immobilized biopolymers can be used to for various binding assays (e.g. cols.1-2), and thus indicating the functionality (or binding activity) of the "biopolymers" are retained.

'043 and '580

Appellants traversed the above rejection over the '043 patent (or the '580 patent) by arguing the followings:

The Appellant again assert that the claims of the '043 patent (or the '580 patent) are directed to a method of fabricating an array of biopolymers by in-situ synthesis. Appellants assert because "multiple iterative steps are performed in order to form the final features on the array" of the '043 patent, the '043 patent is distinguishable over the instant claimed invention. (Brief, pp.43+).

Contrary to appellant assertion, the '043 patent claims the followings:

"A method of fabricating an array of biopolymers on a substrate using a biopolymer or biomonomer fluid", which the biopolymer fluid read on a fluid containing a protein reagent because the '043 patent defines the term "biopolymer" to include proteins (See Claim 1 and Column 5, lines 63+). The '340 patent does not specifically claim "in-situ synthesis" as asserted by appellant. Even if "in-situ synthesis" is intended by the '043 patent, the instant claim language is broad and would encompass the so-called "in-situ synthesis" process.

'266

Appellants traversed the above rejection over the '266 patent by arguing the followings:

Similar to the traversal over the '740, and '043 (or '580) patents, the Appellant again assert that the claims of the '266 patent are directed to a method of fabricating an array of biopolymers by in-situ synthesis. Appellants assert because "multiple iterative steps are performed in order to form the final features on the array" of the '043 patent, the '043 patent is distinguishable over the instant claimed invention. (Brief, pp.46+).

Contrary to appellant assertion, the '043 patent claims the followings:

"A method of fabricating an array of biopolymers on a substrate using a biopolymer or biomonomer fluid", which the biopolymer fluid read on a fluid containing a protein reagent because the '266 patent defines the term "biopolymer" to include proteins (See Claim 1 and Column 6, lines 14-15). The '266 patent does not specifically claim "in-situ synthesis" as asserted by appellant. Even if "in-situ synthesis" is intended by the '266 patent, the instant claim language is broad and would encompass the so-called "in-situ synthesis" process.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Sue Liu

/SUE LIU/

Examiner, Art Unit 1639

Conferees:

Doug Schultz, SPE 1639/1635

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